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EXAMINER	
GUILL, RUSSELL L	
ART UNIT	**PAPER NUMBER**
2123	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	**Application No.** 10/540,427	**Applicant(s)** CHANG ET AL.	
	Examiner Russ Guill	**Art Unit** 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to a Request for Continued Examination filed November 3, 2008. Claim 8 was canceled. No claims were added. Claims 1 – 7, 9 – 22 are pending and have been examined. Claims 1 – 7, 9 - 22 have been rejected.

2. **As previously recited, the Examiner would like to thank the Applicant for the well presented response. The Examiner appreciates the effort to carefully analyze the Office action, and make appropriate amendments and arguments.**

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 3, 2008 has been entered.

Response to Remarks

4. Regarding the objection to the specification:

    a. Applicant's amendments overcome the objection.

5. Regarding claim 10 rejected under 35 USC § 112, first paragraph:

    a. Applicant's arguments have been fully considered, but are not persuasive, as follows.

    b. The Applicant primarily argues:

    c. The Examiner asserts, "The specification does not appear to describe radiation absorption spectra of primary heating sources".

    d. The Applicants respectfully disagree with the Examiner's assertion. It is clear from paragraph [0025] of the Specification, that radiation absorption spectra is described. Paragraph [0025] states that the equation of

paragraph [0022] is used to "determine the total energy emitted for an entire range of wavelengths" (the "spectra"). The "spectra" of values derived from the equation are then multiplied by the emissivity of the lamps (the "primary heating source") to obtain a radiation output (the "radiation") that "is used as the energy incident upon the preform... for absorption calculations" (the "absorption"). It would be clear to one of ordinary skill in the art upon a mere reading of paragraph [0025] that the paragraph [0025] describes a method of determining the spectra of radiation absorbed by the preform based on the primary heating source. Therefore, because the Applicants have provided a "written description of the invention... in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains... to make and use the same", Applicant's respectfully request that the Examiner withdrawal the rejection of Claim 10 under 35 U.S.C. §l12, first paragraph.

i. The Examiner respectfully replies:

ii. First, the specification does not appear to have paragraph numbers, so the Examiner is assuming that the paragraph numbers recited in the argument refer to the Patent Application Publication 2006/0074614 for the Applicant's invention.

iii. The argument recites, "The "spectra" of values derived from the equation are then multiplied by the emissivity of the lamps (the "primary heating source") to obtain a radiation output (the "radiation") that "is used as the energy incident upon the preform... for absorption calculations" (the "absorption"). It would be clear to one of ordinary skill in the art upon a mere reading of paragraph [0025] that the paragraph [0025] describes a method of determining the spectra of radiation absorbed by the preform based on the primary heating source". While the specification may describe a method of determining the spectra of radiation absorbed by the preform based on the primary heating source, the claim limitation recites, "radiation absorption spectra of said primary heating source incident on said preform", which is different than the supported method. Thus, the Applicant's argument appears to be directed to a different method than the claim limitation, and accordingly, the rejection is maintained. Further, the plain language meaning of "radiation absorption spectra" appears to be the spectra of radiation that is absorbed, which would not appear to be able to be incident on a perform since it appears to be radiation that is already absorbed.

6. Regarding claim 11 rejected under 35 USC § 112, first paragraph:

a. Applicant's arguments have been fully considered, but are not persuasive, as follows.

b. The Applicant primarily argues:

c. Examiner rejected Claim 11 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Examiner stated, "the claim does not appear to be described in the specification."

d. Claim 11 recites:

i. The method according to claim 10 wherein said radiation spectra transmitted through a respective block of said preform is provided as an input for determining said absorption radiation incident to a next adjacent block.

e. Paragraph [0026] dicloses, in part:

i. The inputted preform geometry is discretized (or digitized) into a plurality of small rectangular blocks having a respective volume (shown in FIG. 4). An amount of energy absorbed into each discretized block is calculated and utilized for a temperature calculation. Also, radiation transmitted through a respective discretized block is used in calculating the energy incident and absorbed in a next adjacent discretized block. The radiation absorbed by each respective discretized block is incident to the direct exposure or viewing angle of each lamp as each respective discretized block travels through the oven (FIG. 5).

f. Paragraph [0026] discloses all of the limitations of Claim 11.

i. The Examiner respectfully replies:

ii. Initially, the recited claim 11 above appears to be different than the language of claim 11 as filed. However, the claim language recited above still appears to lack written description because the specification does not appear to teach absorption radiation incident to a next block; rather it teaches that transmitted radiation incident to a next block. Accordingly, the rejection is maintained.

7. Regarding claims 1, 15 – 17, 22 rejected under 35 USC § 103:

a. Applicant's arguments have been fully considered, but are not persuasive, as follows.

b. The Applicant primarily argues:

c. Applicants respectfully assert that the Examiner has failed to establish a prima facie case of obviousness in regards to independent Claims 1, 15-17, and 22 because one skilled in the art would not be motivated or have any suggestion to combine the references.

i. The Examiner respectfully replies:

ii. A motivation to combine the art of Turner is recited in the rejection below. The argument is not persuasive because the argument appears to

merely assert that one skilled in the art would not be motivated or have in the suggestion to combine the references, without providing a supporting rationale.

d. The Applicant primarily argues:

e. As discussed above, the Applicants believe they have successfully traversed the Examiner's rejection of Claim 10 under 35 U.S.C. § 112, first paragraph. Therefore, the incorporation of the limitations of Claim 10 into independent Claims 1, 15-17, and 22 results in claims allowable over the cited references.

i. The Examiner respectfully replies:

ii. As discussed above, the rejection of claim 10 under 35 USC 112, first paragraph, is maintained, and thus the independent claims are now similarly rejected since claim 10 has been incorporated in the independent claims.

f. The Applicant primarily argues:

g. Furthermore, a thorough examination of Reeve, Turner, and McEvoy shows that they are completely devoid of any disclosure regarding determining a view factor of the preform or container being heated characterized as the radiation absorption spectra of primary heating sources at a particular oven location. Therefore as discussed above, there is no motivation to combine the references, and even if the references are combined, the combination does not produce the limitation of determining a view factor.

i. The Examiner respectfully replies:

ii. While the reference by Siegel appears to teach the limitation, the limitation also appears to be taught by the reference by Turner, as recited in the rejections below.

iii. The argument is not persuasive because the argument appears to merely assert that one skilled in the art would not be motivated or have in the suggestion to combine the references, without providing a supporting rationale.

h. The Applicant argues:

i. Claims 8 and 9 depend, directly or indirectly, from Claim 1. For the reasons stated above, the combination of Reeve and Turner do not disclose each and every limitation of Claim 1, namely, disclosure regarding determining a view factor of the preform or container being heated characterized as the radiation absorption spectra of primary heating sources at a particular oven location. The Examiner relied on the Siegel reference for an alleged teaching of

determining an absorption spectra and the alleged teaching of discretizing the preform into a plurality of blocks of a respective volume, wherein the absorption spectra is determined for each of the blocks. A thorough examination of Siegel shows that it is completely devoid of any disclosure regarding determining a view factor of the preform or container being heated characterized as the radiation absorption spectra of primary heating sources at a particular oven location. Accordingly, the Siegel reference does not cure the defects of Reeve and Turner, and the combination of Reeve, Turner, and Siegel and cannot properly serve as a basis for rejection of Claims 8 and 9 under 35 U.S.C. § 103(a).

i. The Examiner respectfully replies:

ii. The rejection of claim 1 was maintained as discussed above, and thus the rejection of claims 8 and 9 are maintained.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

a. **Claims 1 - 7, 9 - 22** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

i. Regarding claim 1 and dependent claims, the claim 1 recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

ii. Regarding claim 10, the claim recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

iii. R

egarding claim 11, the claim does not appear to be described in the specification. Especially, radiation absorption spectra do not appear to be incident upon a next adjacent block.

iv. Regarding claim 15, the claim 15 recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

v. Regarding claim 16, the claim 16 recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

vi. Regarding claim 17 and dependent claims, the claim 17 recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

vii. Regarding claim 22, the claim 22 recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

a. **Claims 1 - 7, 9 - 22** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

i. Regarding claim 1, the claim recites in lines 10 – 11, "said step of determining said radiation spectra". The term appears to have insufficient antecedent basis.

ii. Regarding claim 15, the claim recites in lines 11 – 12, "said step of determining said radiation spectra". The term appears to have insufficient antecedent basis.

iii. Regarding claim 16, the claim recites in lines 11 – 12, "said step of determining said radiation spectra". The term appears to have insufficient antecedent basis.

iv. Regarding claim 17, the claim recites in lines 12 – 13, "said step of determining said radiation spectra". The term appears to have insufficient antecedent basis.

v. Regarding claim 22, the claim recites in lines 14 – 15, "said step of determining said radiation spectra". The term appears to have insufficient antecedent basis.

vi. Dependent claims inherit the rejections of their parent claims.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the

various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. **Claims 1, 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve (Hayden M. Reeve et al., "Experimental and Numerical Investigation of Polymer Preform Heating", April 2001, Journal of Materials Processing & Manufacturing Science, Volume 9, pages 285 – 301) in view of Turner (Travis L. Turner et al., "Numerical and Experimental Analyses of the Radiant Heat Flux Produced by Quartz Heating Systems", March 1994, NASA Technical Paper 3387, pages 1 - 37).

a. The art of Reeve is directed to experimental and numerical investigation of polymer preform heating (*title*).

b. The art of Turner is directed to analyses of radiant heat flux produced by quartz heating systems (*title*).

c. The art of Turner and the art of Reeve are analogous art because they both pertain to the art of thermal radiation heat transfer. Further, the ordinary artisan would have known that quartz heaters were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

d. The motivation to use the art of Turner with the art of Reeve would have been the benefit recited in Turner that a method is developed for predicting the radiant heat flux distribution produced by quartz envelope heating systems (*page 1, section "Summary", first paragraph*), which would have been recognized as a benefit by the ordinary artisan because the ordinary artisan would have known that quartz heating systems were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*). Further, Turner recites the benefit that it was

found very beneficial to use importance sampling for analysis of lamp systems (*page 30, left-side column, third paragraph that starts with, "The simulated results . . ."*), which the ordinary artisan would have recognized as a benefit to reduce the computational burden (*page 2, right-side column, second paragraph that starts with, "Chou (ref. 21) . . ."*). Further, Turner recites the benefit that the method can be used to analyze very complicated quartz heating systems in a straightforward manner (*page 1, section "Summary", third paragraph*), which would have been recognized as a benefit by the ordinary artisan.

e. Regarding **claims 1, 17**:

f. Reeve appears to teach:

g. A method for simulating the heating of a plastic preform (*page 285, title, and abstract*).

h. inputting a preform geometry into a preform design program (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2*);

i. providing oven geometry and calculating spatial location of said preform through at least one oven (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2; it would have been obvious to calculate the spatial location of a preform through an oven, for example, see U.S. patent 4,407,651, column 1, lines 15 - 18, and U.S. patent 5,607,706, column 6, lines 8 - 15, both patents disclose a preform moving through an oven*);

j. providing heating information (*page 289, section labeled "Model", third paragraph, "The furnace wall temperature profile and iris temperatures were prescribed . . ."*) ~~and calculating temperatures of primary and secondary heating sources~~;

k. solving energy equations based upon said preform geometry, said spatial location of said preform, said temperatures, cooling air and radiation absorption spectra of a material of said preform (*pages 290 -*

291, section labeled "Governing Equations", especially equation 4, the energy equation;and page 289, section labeled "Model"), ~~wherein said step of determining said radiation absorption spectra includes determining a view factor, said view factor characterized as said radiation absorption spectra of said primary heating sources~~ incident on said preform at a respective oven location (*page 288, page 291, first paragraph; also please note that the equation at the top teaches a view factor F_{k-j}*); and

l. computing at least one cross sectional thermal profile of a final heated preform (*page 293, figure 4, section (c), please note the temperature profile of the preform; and pages 293 - 294, section labeled "Predicted Heat and Flow Patterns"*).

m. Reeve does not specifically teach:

n. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources;

o. wherein said step of determining said radiation absorption spectra includes determining a view factor, said view factor characterized as said radiation absorption spectra of said primary heating sources ~~incident on said preform at a respective oven location~~.

p. Turner appears to teach:

q. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources (*page 11, right-side column, starting at the second paragraph that starts with, "A filament has a radiative power . . ."; and pages 2 - 3, section labeled "Scope of the Present Study"; and page 7, section "Simulation"*);

r. wherein said step of determining said radiation absorption spectra includes determining a view factor (*page 2, left-side column, second paragraph, "the differential view factor"; page 6, calculation of view factor*), said view factor characterized as said radiation absorption spectra of said primary heating sources incident on ~~said preform at a respective oven location~~ (*page 12, section "Spectral and Directional Properties"*).

s. Obviousness must be determined in light of the knowledge of the ordinary artisan. Prior art is not limited just to the references being applied, but includes the understanding of one of ordinary skill in the art. The following references teach knowledge of the ordinary artisan at the time of invention.

i. Robert Siegel and John R. Howell, "Thermal Radiation Heat Transfer", 2002, Taylor & Francis, pages 35 – 63, 155 – 192, 207 – 248, 267 – 286, 295 – 325, 335 – 357, 371 – 406, 419 – 429; teaches view factors (configuration factors, especially chapter 5) and radiation absorption spectra in radiation exchange (especially page 268, section 7-2, first paragraph, second sentence; and page 283, equation 7-19, $\alpha_{\lambda,1}$ is an absorption dependent upon wavelength; and pages 425 – 426, section 11-3.3 The Absorption Coefficient).

t. The MPEP recites in section 2121.01:

i. A reference contains an "enabling disclosure" if the public was in possession of the claimed invention before the date of invention. "Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his [or her] own knowledge to make the claimed invention." In re Donohue, 766 F.2d 531, 226 USPQ 619 (Fed. Cir. 1985).

u. The "mere existence of differences between the prior art and an invention does not establish the invention's nonobviousness." Dann v. Johnston, 425 U.S. 219, 230, 189 USPQ 257, 261 (1976). The gap between the prior art and the claimed invention may not be "so great as to render the [claim] nonobvious to one reasonably skilled in the art." Id. A prior art reference must be considered together with the knowledge of one of ordinary skill in the pertinent art. A reference need not explain every detail since it is speaking to those skilled in the art. *In re Paulsen*.

v. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner with the art of Reeve to produce the claimed invention.

13. **Claims 2 – 7, 12 - 14 and 18 - 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve as modified by Turner as applied to claims 1 and 17 above, further in view of McEvoy (J.P. McEvoy et al., "Simulation of the Stretch Blow Molding Process of PET Bottles", 1998, Advances in Polymer Technology, volume 17, number 4, pages 339 – 352).

a. Reeve as modified by Turner teaches a method for simulating the heating of a plastic perform as recited in claims 1 and 17 above.

b. The art of McEvoy is directed to simulation of the blow molding process of PET bottles (*page 339, title*).

c. The art of McEvoy and the art of Reeve as modified by Turner are analogous art because they both pertain to the art of preform heating (*McEvoy, page 340, figures 1 and 2, and left-side column, second paragraph, and right-side column, first paragraph*).

d. The motivation to use the art of McEvoy with the art of Reeve as modified by Turner would have been the benefit recited in McEvoy that a simulation was successfully carried out to evaluate the optimum process conditions for a given preform and bottle (*page 351, section labeled "Conclusions", last sentence*), which would have been recognized as a benefit by the ordinary artisan.

e. Regarding **claim 2**:

f. Reeve does not specifically teach:

g. `providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform;`

h. McEvoy appears to teach:

i. providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform (*page 343 – 344, section labeled "Material Model", it would have been obvious that an elastic model included stress/strain behavior; and page 339, title*);

j. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

k. Regarding **claim 3**:

l. Reeve does not specifically teach:

m. generating a bottle geometry for a bottle design;

n. McEvoy appears to teach:

o. generating a bottle geometry for a bottle design (*page 340, figure 1, right-most two figures show a bottle geometry; it would have been obvious that simulation of blow molding of bottles needed a bottle geometry*);

p. Regarding **claim 4**:

q. Reeve does not specifically teach:

r. determining a bottle wall thickness profile;

s. McEvoy appears to teach:

t. determining a bottle wall thickness profile (*page 339, abstract, "the predicted bottle wall thickness distribution . . ."; and page 351, figure 32*).

u. Regarding **claim 5**:

v. Reeve does not specifically teach:

w. performing a design optimization routine;

x. Official Notice is taken that it was old and well known in the art to perform a design optimization routine for optimizing a design. It would have been obvious to the ordinary artisan at the time of invention to perform a design optimization routine with the art of Reeve, Turner and McEvoy to optimize a design of a preform. The motivation would have been the knowledge of the ordinary artisan that optimizing a design saves money. Please refer to U.S. Patent Number 6,725,112 (*figure 2, element 22*) and U.S. Patent Number 6,973,389 (*figure 1, element 30*) for examples of optimization modules.

y. Regarding **claim 6**:

z. Reeve does not specifically teach:

aa. Incorporating the geometry of an existing preform to determine its fitness for use in a specific application;

bb. McEvoy appears to teach:

cc. Incorporating the geometry of an existing preform to determine its fitness for use in a specific application (*page 340, figure 2 displays an existing preform*);

dd. Regarding **claim 7**:

ee. Reeve does not specifically teach:

ff. determining an emission spectra of said primary and secondary heating sources.

gg. Turner appears to teach:

hh. determining an emission spectra of said primary and secondary heating sources (*page 12, section "Source Spectral Distributions"*).

ii. Regarding **claim 12**:

jj. Reeve as modified by Turner does not specifically teach:

kk. discretizing said preform into a plurality of sections.

ll. McEvoy appears to teach:

mm. discretizing said preform into a plurality of sections (*page 343, figure 12, solid element perform; McEvoy performs a finite element analysis which discretizes the preform*).

nn. Regarding **claim 13**:

oo. Reeve as modified by Turner does not specifically teach:

pp. Determining an axial orientation and hoop orientation.

qq. McEvoy appears to teach:

rr. Determining an axial orientation and hoop orientation (*page 349, right-side column, third paragraph, axial and hoop stretch; further McEvoy performed a finite element analysis which would have required a stress tensor which provides hoop and axial direction stress*).

ss. Regarding **claim 14**:

tt. Reeve as modified by Turner does not specifically teach:

uu. axial orientation and hoop orientation are determined for each of said plurality of sections.

vv. McEvoy appears to teach:

ww. axial orientation and hoop orientation are determined for each of said plurality of sections (*page 343, figure 12, solid element preform, McEvoy performed a finite element analysis which would have used the hoop and axial stresses at each element*).

xx. Regarding **claim 18**:

yy. Reeve does not specifically teach:

zz. providing a stress/strain behavior of said material as a function of said temperatures derived in said perform heating module and simulating stretch blow molding of said heated preform;

aaa. McEvoy appears to teach:

bbb. providing a stress/strain behavior of said material as a function of said temperatures derived in said preform heating module and simulating stretch blow molding of said heated preform (*page 343 - 344, section labeled "Material Model", especially "To accurately model the mechanical properties of PET, . . . temperature dependence and strain history should be taken into account"; it would have been obvious that an elastic model included stress/strain behavior*);

ccc. Regarding **claim 19**:

ddd. Reeve does not specifically teach:

eee. Means for generating a bottle geometry for a bottle design;

fff. McEvoy appears to teach:

ggg. Means for generating a bottle geometry for a bottle design (*page 340, figure 1, right-most two figures show a bottle geometry; it would have been obvious that simulation of blow molding of bottles needed a bottle geometry*);

hhh. Regarding **claim 20**:

iii. Reeve does not specifically teach:

jjj. determining a bottle wall thickness;

kkk. McEvoy appears to teach:

lll. determining a bottle wall thickness (*page 339, abstract, "the predicted bottle wall thickness distribution . . ."; and page 351, figure 32*).

mmm. Regarding **claim 21**:

nnn. McEvoy appears to teach:

ooo. ~~a design optimization module for~~ optimizing a material distribution efficiency of said preform (*page 340, right-side column, first sentence, "Generally, preform design is optimized by trial and error; however the development of computer techniques has provided a*

shift toward a more scientific design approach.", and page 339, Abstract, "predicted wall thickness distribution");

ppp. Official Notice is taken that it was old and well known in the art to have a design optimization module for optimizing a design. It would have been obvious to the ordinary artisan at the time of invention to use a design optimization module for optimizing a design with the art of Reeve, Turner and McEvoy to optimize a material distribution efficiency of a preform. The motivation would have been the knowledge of the ordinary artisan that optimizing a design saves money. Please refer to U.S. Patent Number 6,725,112 (*figure 2, element 22*) and U.S. Patent Number 6,973,389 (*figure 1, element 30*) for examples of optimization modules.

14. **Claims 9 - 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve as modified by Turner as applied to claims 1 and 17 above, further in view of Siegel (Robert Siegel and John R. Howell, "Thermal Radiation Heat Transfer", 2002, Taylor & Francis, pages 35 – 63, 155 – 192, 207 – 248, 267 – 286, 295 – 325, 335 – 357, 371 – 406, 419 – 429).

a. Reeve as modified by Turner teaches a method for simulating the heating of a plastic perform as recited in claims 1 and 17 above.

b. The art of Siegel is directed to thermal radiation heat transfer (*title*).

c. The art of Siegel and the art of Reeve as modified by Turner are analogous art because they both pertain to the art of thermal radiation heat transfer (*Reeve, page 285, Abstract*).

d. The motivation to use the art of Siegel with the art of Reeve as modified by Turner would have been the knowledge of the ordinary artisan that when surface absorptivity depends upon wavelength, that the calculation methods of chapter 7 would apply (*Siegel, pages 267 – 268, sections 7-1 and 7-2*).

e. Regarding **claim 9**:

f. Reeve appears to teach:

g. ~~Discretizing~~ said preform ~~into a plurality of blocks of a respective volume, wherein said radiation absorption spectra is determined for each of said plurality of blocks~~ (*page 288, figure 2, preform*);

h. Reeve does not specifically teach:

i. Discretizing ~~said perform~~ into a plurality of blocks of a respective volume, wherein said radiation absorption spectra is determined for each of said plurality of blocks;

j. Siegel appears to teach:

k. Discretizing *a surface* ~~said perform~~ into a plurality of blocks of a respective volume, wherein said radiation absorption spectra is determined for each of said plurality of blocks (*page 283, equation 7-19, and following paragraph,* $\alpha_{\lambda,1}$ *is an absorption dependent upon wavelength, and* A_k *is a discretized area; and page 376, figure 10-3, volume element, and last sentence on the page*);

l. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Siegel and the art of Reeve as modified by Turner to produce the claimed invention.

m. Regarding **claim 10**:

n. Reeve appears to teach:

o. Determining said view factor, said view factor further characterized as said radiation absorption spectra of said primary heating sources incident to each of said plurality of blocks of said perform at a respective oven location, said view factor provided by the formula:

$$V_f = (1/\pi)\int dA_p \int Cos\varphi Cos\theta\ dA_h/r^2$$

where A_p is a discretized area of said preform, A_h is an area of a heater, φ is an angle between a normal to a preform surface and an incremental area on said heater, θ is an angle between a normal to heater surface and an incremental area on said preform, and r is a distance between A_p and A_h [[.]] ;

(*page 291, first paragraph; please note that the equation at the top teaches a view factor F_{k-j}; please note that the formula for a view factor was common knowledge in the art, for example, see Turner page 6, and Siegel, chapter 5*).

15. **Claims 15, 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve (Hayden M. Reeve et al., "Experimental and Numerical Investigation of Polymer Preform Heating", April 2001, Journal of Materials Processing & Manufacturing Science, Volume 9, pages 285 – 301) in view of Turner (Travis L. Turner et al., "Numerical and Experimental Analyses of the Radiant Heat Flux Produced by Quartz Heating Systems", March 1994, NASA Technical Paper 3387, pages 1 - 37), further in view of McEvoy (J.P. McEvoy et al., "Simulation of the Stretch Blow Molding Process of PET Bottles", 1998, Advances in Polymer Technology, volume 17, number 4, pages 339 – 352).

a. The art of Reeve is directed to experimental and numerical investigation of polymer preform heating (*title*).

b. The art of Turner is directed to analyses of radiant heat flux produced by quartz heating systems (*title*).

c. The art of McEvoy is directed to simulation of the blow molding process of PET bottles (*page 339, title*).

d. The art of Turner and the art of Reeve are analogous art because they both pertain to the art of thermal radiation heat transfer. Further, the ordinary artisan would have known that quartz heaters were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

e. The art of McEvoy and the art of Reeve are analogous art because they both pertain to the art of preform heating (*McEvoy, page 340, figures 1 and 2, and left-side column, second paragraph, and right-side column, first paragraph*).

f. The motivation to use the art of Turner with the art of Reeve would have been the benefit recited in Turner that a method is developed for predicting the radiant heat flux distribution produced by quartz envelope heating systems (*page 1, section "Summary", first paragraph*), which would have been recognized as a benefit by the ordinary artisan because the ordinary artisan would have known that quartz heating systems were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*). Further, Turner recites the benefit that it was found very beneficial to use importance sampling for analysis of lamp systems (*page 30, left-side column, third paragraph that starts with, "The simulated results . . ."*). Further, Turner recites the benefit that the method can be used to analyze very complicated quartz heating systems in a straightforward manner (*page 1, section "Summary", third paragraph*), which would have been recognized as a benefit by the ordinary artisan.

g. The motivation to use the art of McEvoy with the art of Reeve would have been the benefit recited in McEvoy that a simulation was successfully carried out to evaluate the optimum process conditions for a given preform and bottle (*page 351, section labeled "Conclusions", last sentence*), which would have been recognized as a benefit by the ordinary artisan.

h. Regarding **claim 15**:

i. Reeve appears to teach:

j. inputting a preform geometry into a preform design program (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2*);

k. providing oven geometry and calculating spatial location of said preform through at least one oven (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2; it would have been obvious to calculate the spatial location of a preform through an oven, for example, see U.S. patent 4,407,651, column 1, lines 15 - 18, and U.S. patent 5,607,706, column 6, lines 8 - 15, both patents disclose a preform moving through an oven*);

l. providing heating information (*page 289, section labeled "Model", third paragraph, "The furnace wall temperature profile and iris temperatures were prescribed . . ."*) ~~and calculating temperatures of primary and secondary heating sources~~;

m. solving energy equations based upon said preform geometry, said spatial location of said preform, said temperatures, cooling air and radiation absorption spectra of a material of said preform (*pages 290 - 291, section labeled "Governing Equations", especially equation 4, the energy equation;and page 289, section labeled "Model")* ~~wherein said step of determining said radiation absorption spectra includes determining a view factor, said view factor characterized as said radiation absorption spectra of said primary heating sources~~ incident on said preform at a respective oven location (*page 288, page 291, first paragraph; also please note that the equation at the top teaches a view factor F_{k-j}*); and

n. computing at least one cross sectional thermal profile of a final heated preform (*page 293, figure 4, section (c), please note the temperature profile of the preform; and pages 293 - 294, section labeled "Predicted Heat and Flow Patterns"*).

o. Reeve does not specifically teach:

p. A method for the virtual prototyping of plastic containers;

q. generating a bottle geometry for a bottle design;

r. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources;

s. wherein said step of determining said radiation absorption spectra includes determining a view factor, said view factor characterized as

said radiation absorption spectra of said primary heating sources ~~incident on said preform at a respective oven location~~.

t. providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform; and

u. determining a bottle wall thickness profile.

v. Turner appears to teach:

w. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources (*page 11, right-side column, starting at the second paragraph that starts with, "A filament has a radiative power . . ."; and pages 2 - 3, section labeled "Scope of the Present Study"*);

x. wherein said step of determining said radiation absorption spectra includes determining a view factor (*page 2, left-side column, second paragraph, "the differential view factor"; page 6, calculation of view factor*), said view factor characterized as said radiation absorption spectra of said primary heating sources incident on ~~said preform at a respective oven location~~ (*page 12, section "Spectral and Directional Properties"*).

y. McEvoy appears to teach:

z. A method for the virtual prototyping of plastic containers (*page 339, title*);

aa. generating a bottle geometry for a bottle design (*page 340, figure 1, right-most two figures show a bottle geometry; it would have been obvious that simulation of blow molding of bottles needed a bottle geometry*);

bb. providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform (*page 343 - 344, section labeled "Material Model", it would have been obvious that an elastic model included stress/strain behavior; and page 339, title*);

cc. determining a bottle wall thickness profile (*page 339, abstract, "the predicted bottle wall thickness distribution . . ."; and page 351, figure 32*).

dd. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

ee. Regarding **claim 16**:

ff. The rejection of claim 15 above teaches most of claim 16 also. The differences are taught below.

gg. Reeve does not specifically teach:

hh. Generating a preform design for said bottle by means of a preform design program;

ii. McEvoy appears to teach:

jj. Generating a preform design for said bottle by means of a preform design program (*pages 342 – 342, section labeled "ABAQUS Model" and figures 11 and 12; it would have been obvious that ABAQUS was used to design a preform. Further, the prior art of the Applicant admits that U.S. Patent 6,116,888 teaches utilizing a CAD software to design a bottle, and it would have been obvious to use the CAD software to design the preform also*);

kk. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

16. **Claim 22** is rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve (Hayden M. Reeve et al., "Experimental and Numerical Investigation of Polymer Preform Heating", April 2001, Journal of Materials Processing & Manufacturing Science, Volume 9, pages 285 – 301) in view of Turner (Travis L. Turner et al., "Numerical and Experimental Analyses of the Radiant Heat Flux Produced by Quartz Heating Systems", March 1994, NASA Technical Paper 3387, pages 1 - 37), further in view of McEvoy (J.P. McEvoy et al., "Simulation of the Stretch Blow Molding Process of

PET Bottles", 1998, Advances in Polymer Technology, volume 17, number 4, pages 339 – 352).

a. The art of Reeve is directed to experimental and numerical investigation of polymer preform heating (*title*).

b. The art of Turner is directed to analyses of radiant heat flux produced by quartz heating systems (*title*).

c. The art of McEvoy is directed to simulation of the blow molding process of PET bottles (*page 339, title*).

d. The art of Turner and the art of Reeve are analogous art because they both pertain to the art of thermal radiation heat transfer. Further, the ordinary artisan would have known that quartz heaters were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

e. The art of McEvoy and the art of Reeve are analogous art because they both pertain to the art of preform heating (*McEvoy, page 340, figures 1 and 2, and left-side column, second paragraph, and right-side column, first paragraph*).

f. The motivation to use the art of Turner with the art of Reeve would have been the benefit recited in Turner that a method is developed for predicting the radiant heat flux distribution produced by quartz envelope heating systems (*page 1, section "Summary", first paragraph*), which would have been recognized as a benefit by the ordinary artisan because the ordinary artisan would have known that quartz heating systems were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*). Further, Turner recites the benefit that it was found very beneficial to use importance sampling for analysis of lamp systems (*page 30, left-side column, third paragraph that starts with, "The simulated results . . ."*). Further, Turner recites the benefit that the method can be used to analyze very complicated quartz heating systems in a straightforward manner (*page 1, section "Summary", third paragraph*), which would have been recognized as a benefit by the ordinary artisan.

g. The motivation to use the art of McEvoy with the art of Reeve would have been the benefit recited in McEvoy that a simulation was successfully carried out to evaluate the optimum process conditions for a given preform and bottle (*page 351, section labeled "Conclusions", last sentence*), which would have been recognized as a benefit by the ordinary artisan.

h. Regarding **claim 22**:

i. Claim 15 above teaches most of the limitations of claim 22. The differences are taught below.

j. Reeve does not specifically teach:

k. determining a stress/strain behavior of said material as a function of said temperatures derived in said preform heating module;

l. a design optimization module for optimizing a material distribution efficiency of said preform.

m. McEvoy appears to teach:

n. providing a stress/strain behavior of said material as a function of said temperatures derived in said preform heating module (*page 343 – 344, section labeled "Material Model", especially "To accurately model the mechanical properties of PET, . . . <u>temperature dependence</u> and strain history should be taken into account"; it would have been obvious that an elastic model included stress/strain behavior*);

o. ~~a design optimization module for~~ optimizing a material distribution efficiency of said preform (*page 340, right-side column, first sentence, "Generally, preform design is optimized by trial and error; however the development of computer techniques has provided a shift toward a more scientific design approach.", and page 339, Abstract, "predicted wall thickness distribution"*);

p. Official Notice is taken that it was old and well known in the art to have a design optimization module for optimizing a design. It would have been obvious to the ordinary artisan at the time of invention to use a design optimization module for optimizing a design with the art of Reeve, Turner and McEvoy to optimize a material distribution efficiency of a preform. The motivation would have been the knowledge of the ordinary artisan that optimizing a design saves money. Please refer to U.S. Patent Number 6,725,112 (*figure 2, element 22*) and U.S. Patent Number 6,973,389 (*figure 1, element 30*) for examples of optimization modules.

q. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

17. **Examiner's Note:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the Applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. The entire reference is considered to provide disclosure relating to the claimed invention.

Allowable Subject Matter

18. Any indication of allowability is withheld pending resolution of the outstanding rejections.

Conclusion

19. The prior art made of record in the previous Office action and not relied upon is considered pertinent to the applicant's disclosure:

a. Robert Siegel and John R. Howell, "Thermal Radiation Heat Transfer", 2002, Taylor & Francis, pages 35 – 63, 155 – 192, 207 – 248, 267 – 286, 295 – 325, 335 – 357, 371 – 406, 419 – 429; teaches knowledge of the ordinary artisan regarding radiation heat transfer (claims 8 – 12), including heat transfer using absorption spectra of materials, and convection.

b. P.G. Llana et al., "Finite strain behavior of poly(ethylene terephthalate) above the glass transition temperature", 1999, Polymer, pages 6729 – 6751; teaches knowledge of the ordinary artisan regarding temperature dependence of stress/strain in PET.

c. M.C. Boyce et al., "Constitutive model for the finite deformation stress-strain behavior of poly(ethylene terephthalate) above the glass transition temperature", 2000, Polymer, pages 2183 – 2201; teaches knowledge of the ordinary artisan regarding temperature dependence of stress/strain in PET.

d. G. Venkateswaran et al., "Effects of Temperature Profiles through Preform Thickness on the Properties of Reheat-Blown PET Containers", 1998, Advances in Polymer Technology, Volume 17, Number 3, pages 237 – 249; teaches knowledge of the ordinary artisan, especially hoop and axial orientations (claims 13 and 14).

e. Ph. Lebaudy et al., "Heating Simulation of Multilayer Preforms", 2001, Journal of Applied Polymer Science, Volume 80, pages 2683 – 2689; teaches knowledge of the ordinary artisan including spectral absorption characteristics of a preform.

f. Kevin Sandieson et al., "Case study of simulation software in the production design phase", 2001, ANTEC 2001 Conference Proceedings, Volume 3, two unnumbered pages; teaches perform design using software.

g. U.S. Patent 4,407,651 teaches quartz heating systems were used in preform heating, and a preform moving through an oven.
h. U.S. patent 5,607,706 teaches a preform moving through an oven.
i. U.S. patent 6,116,888 teaches utilizing a CAD software to design a bottle.
j. U.S. Patent 6,725,112 teaches an optimization module.
k. U.S. Patent 6,973,389 teaches an optimization module.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russ Guill whose telephone number is 571-272-7955. The examiner can normally be reached on Monday – Friday 9:30 AM – 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Any inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group Receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Russ Guill
Examiner
Art Unit 2123

RG

/Paul L Rodriguez/
Supervisory Patent Examiner, Art Unit 2123